COLUMNAR SECTION FROM

PALEN DRY LAKE NO. 1

GAMMA-RAY LOG FROM

PALEN DRY LAKE NO. 2

(c/s) Depth Depth Depth (Feet) Depth (Feet) Description Description 26 c/s ++++ 78 c/s Clay, sandy, moderate-brown (5YR 4/4, damp), calcareous, 65 percent; 4-5 percent subrounded to subangular, medium to very coarse quartz 0 - 10 Clay, silty, moderate—brown (5YR 4/4, damp), high plasticity, calcareous; trace of sand 0 - 10 CLAY, sandy CLAY, silty and gypsum sand; less than 1 percent very Clay, silty, light-brown (5YR 5/6, damp), calcareous; 1-2 percent granules; trace of pebbles fine mafic grains Clay, sandy, light-brown ($5\underline{YR}$ 5/6, damp), similar to 0-10 ft except color Sand, dark-yellowish-orange (10YR 6/6, wet), coarse, subrounded to rounded quartz grains, SAND SAND, clayey calcareous; minor amounts of calcareous clay; GRAVEL, pebbly Sand, light-brown (5YR 5/6, damp), subrounded, 12 - 18 3-5 percent mafic grains iron-stained quartz grains, 1 percent fine SAND AND GRAVEL Sand, similar to 16-20 ft interval except increasing clay content SAND, clayey CLAY, sandy Gravel, pebble, subangular to rounded clasts, Clay, sandy, moderate-brown (5YP 4/4, wet); GRAVEL, granule CLAY AND SAND occasional granules Sand and pebble gravel, fine to medium sand with Clay and sand, interbedded; light-brown (5YR SAND, clayey subangular to subrounded grains; pebbles 5/6, wet) calcareous clay schist, predominantly angular to subangular; minor biotite; interbedded pale-yellowish-Clay and sand, interbedded; pale-yellowish-brow GRAVEL, pebbly brown (10YR 6/2, damp) clay in gravel (10YR 6/2, wet) clay; similar to 30-35 ft interval except color SAND, pebbly Clay, sandy, moderate-brown (5YR 4/4, wet), calcareous; medium sand CLAY, sand CLAY, sandy Gravel, granule, light-brown (5YR 6/4, wet), Clay, sandy, moderate-brown (5YR 4/4, wet), similar to 55-70 ft interval except scattered abundant granules; medium to coarse sand granules and pebbles Sand, clayey, pale-yellowish-brown (10YR 6/2, wet), fine to coarse, subrounded; calcareous clay matrix; occasional granules Clay and sand, interbedded; mottled pale-yellowish-brown (10YR 6/2, wet) and dark-yellowish-orange (10YR 6/6, wet) calcareous clay; interbedded Gravel, pebble, light-brown (5YR 5/6, wet), subangular to angular pebbles as large as 20 mm consisting predominantly of granitic Gravel, granule, very light gray (!-8), subangular to subrounded granules, well sorted; primarily and metamorphic detritus with abundant quartz; granitic detritus Sand, pebbly, light-brown (5YR 5/6, wet), predominantly fine sand with 10 percent medium Gravel, granule, very light gray (N-8), similar to 100-110 ft interval except better sorted to coarse sand; 3 percent pebbles; calcareous GRAVEL, pebbly Gravel, granule, very light gray (N-8), similar to 100-110 ft interval except addition of moderate-yellowish-brown (10XR 5/4) interbedded CLAY AND SAND Clay, sandy, light-brown (5YR 5/6, wet), moderate plasticity, calcareous, 50 percent; 45 percent fine sand; 4 percent granules; 1 percent pebbles. Unit contains interbedded GRAVEL, granule clay lenses in gravels, clay up to 40 percent Gravel, granule, very light gray (N-8), similar to 125-130 ft except clay lenses decreasing CLAY, sandy Clay, sandy, similar to 55-60 ft except clay content decreasing to 40 percent; 45 percent Gravel, granule, very light gray (N-8), similar to 125-130 ft except clay lenses decreasing to 10-15 percent Clay, sandy, similar to 55-60 ft except clay content increasing to 60 percent; 20 percent Clay, pale-yellowish-brown (10YP 6/2, damp), calcareous; includes as much as 25 percent very coarse sand and granule gravel to coarse sand; 20 percent calcareous clay Sand, very light gray (N-8, damp), 90 percent very coarse sand; $1\overline{0}$ percent moderate-yellowish-brown (10YR 5/4) clay interbeds Clay, sandy, same as 80-90 ft Sand, very light gray (N-8, damp), similar to 145-150 ft interval except clay becoming mottled moderate-yellowish-brown (10YE 5/4 damp) and pale-olive (10Y 6/2, damp) and the proposition (No. 10 ft.) Clay, sandy, light-brown (5YR 5/6, wet), calcareous, 45 percent; 30 percent medium sand; SAND 150_ 150_ 15 percent granules; 10 percent pebbles Clay, sandy, light-brown (5YR 5/6, wet), calcareous, 45 percent; 30 percent medium sand; GRAVEL, pebbly Gravel, pebbly, very light gray (N-8, damp); includes 20 percent mottled clay as in 15 percent granules; 10 percent large pebbles GRAVEL, granule 150-155 ft interval 160 - 180 Clay, sandy, light-brown (5YR 5/6, wet), calcareous, 50 percent; 30 percent medium sand; 15 percent granules; 5 percent large pebbles of granitic and metamorphic detritus. Carbo-Gravel, granule, very light gray (11-8); 10-15 percent moderate-yellowish-brown (10\frac{\text{YR}}{5}/4, damp) clay nate cemented sandstone and gypsum crystals in clay matrix between 165-170 ft Gravel, granule, very light gray (N-8, damp), similar to 160-165 ft except moderate-brown (5YR 4/4, damp) clay increasing to 15-20 Clay, pebbly, light-brown (5YR 5/6, wet), calcarecus, 50 percent; contains gypsum crystals as large as 75 mm; 20 percent medium sand; CLAY, pebbly CLAY, with granules 30 percent pebbles 170 - 175 Gravel, granule, very light gray (N-8, damp) GRAVEL, granule Clay, pebbly, light-brown (5YR 5/6, wet), calcareous, 60 percent; 20 percent medium sand; 20 percent pebbles consisting of granitic and metamorphic detritus. Gypsum crystals Gravel, granule, very light gray (N-8, damp) abundant very coarse sand; clay decreasing CLAY, with granules 200_ as large as 75 mm between 190-200 ft 200_ CLAY, sandy Clay, sandy, light-brown (5YR 5/6, wet), calcareous, 70 percent; 30 percent medium sand; 75 percent; 25 percent granules CLAY, micaceous Gravel, granule, very light gray (14-8, damp); 10 percent mottled olive-gray (5½ 4/1, damp) moderate-yellowish-brown (10XR 5/4, damp) Clay, sandy, similar to 200-205 ft except no Clay, sandy, mottled pale-olive (10YR 6/2, wet) and light-brown (5YR 5/6, wet) calcareous Gravel, granule, very light gray (N-8, damp), similar to 185-190 ft except granule gravel NO RECOVERY decreasing to 50 percent; clay increasing sand; 20 percent medium sand; 15 percent CLAY, micaceous Clay, sandy, mottled yellowish-gray (5Y 7/2, wet) and moderate-reddish-brown (10R 4/6, wet), Clay, with granules, mottled moderate—yellowish-brown (10YR 5/4, damp) to light-brown (5YR calcareous; similar to 215-235 ft except Clay, with granules, mottled olive (5Y 4/1, damp) and moderate-yellowish-brown (1CY Clay, sandy, mottled yellow-gray (5Y 7/2, wet) percent; 30 percent medium sand; 15 percent 5/4, damp) clay, 70 percent; granules about 250_ 250___ percent pebbles greater than 20 mm; abundant gypsum crystals in 250-260 ft interval Clay, micaceous, light-brown (5YR 5/6, damp) to moderate-yellowish-brown (10YR 5/4, damp) 75 percent; 10-20 percent granule gravel; 5 Clay, sandy, mottled moderate-yellowish-brown (10YR 5/4, wet) and pale-olive (10Y 6/2, wet), calcareous; similar to 240-260 ft except color No sample recovered: Lithology interpreted same Clay, sandy, moderate—yellowish-brown (10YR 5/4, wet) calcareous clay; similar to 240-260 ft CLAY, with granules Clay, micaceous; light-brown (5YR 5/6, damp) to moderate-yellowish-brown (10YR 5/4, damp); CLAY, pebbly Clay, sandy, mottled light-olive-gray (5Y 5/2, wet) and light-brown (5YR 5/6, wet), calcareous; similar to 240-260 ft except color CLAY, with granules Clay, micaceous, moderate-yellowish-brown (10YR Clay, sandy, light-brown (5YR 5/6, wet), calcareous; similar to 240-260 ft except color CLAY AND SAND (10YR 5/4, damp), 50 percent clay; 30 percent granule gravel; 20 percent medium to coarse Clay, sandy, mottled light-olive-gray (5½ 5/2, wet) and light-brown (5½R 5/6, wet), calcareous; abundant gypsum crystals in clay; similar to 240-260 ft except color Clay, with pebbles, moderate-brown (5YR 4/4, CLAY 300_ damp), clay contains about 5 percent black organic detritus; 10 percent granules; 5 300 Clay, sandy, light-brown (5YR 5/6, damp), calcar-CLAY, sandy 10 percent very coarse sand; 20 percent Clay, with granules, moderate-yellowish-brown (10YR 5/4, damp), 50 percent; 35 percent granules; 15 percent medium sand Clay, sandy, similar to 295-300 ft except decrease CLAY, silty Clay, with very fine interbedded sand, light-GRAVEL, granule Clay, sandy, similar to 295-300 ft except decrease brown (5YR 5/6, damp) clay, 55 percent; 45 in clay and addition of 10 percent pebbles CLAY, sandy Clay, light-brown (5YR 5/6, dry), interbedded with light-olive-gray (5Y 5/2, dry) micaceous Clay, sandy, moderate-brown (5<u>YR</u> 4/4, wet), moderate plasticity, calcareous, 65-68 percent; 20 percent fine sand; 10 percent Clay, sandy, light-brown (5YR 5/6, damp), calcareous; 10 percent medium sand; 10 percent medium sand; 2-5 percent granules; abundant SAND, clayey Clay, sandy, mottled light-brown (5YR 5/6, wet) and light-clive-gray (5Y 5/2, wet), calcareous, 70 percent; 20 percent medium sand; 10 CLAY, with granules Clay, sandy, moderate-yellowish-brown (10\(\text{YF}\) 5/4, damp), calcareous; 10 percent fine sand; 10 CLAY, sandy CLAY, with granules 350_ 350_ abundant gypsum crystals as large as 30 mm Clay, silty, moderate-yellowish-brown (10YR 5/4, CLAY, sandy Clay, with granules, light-brown (5YR 5/6, wet), calcareous, 70 percent; 20 percent granules; CLAY, sandy Gravel, granule, 90 percent granules; mottled moderate-yellowish-brown (10YP 5/4, damp) and light-olive-gray (5Y 5/2, damp) clay CLAY, with granules 10 percent medium sand; abundant gypsum cry-CLAY, gypsiferous Clay, sandy, mottled moderate-brown (5YR 4/4, wet) and light-brown (5YR 5/6, wet), calcareous, 45 percent; 25 percent very coarse sand; 15 percent granules; 15 percent very GRAVEL, granule Clay, sandy, light-brown (5YR 5/6, damp), calcareous; very fine to coarse sand CLAY, with granules fine sand; abundant gypsum crystals Clay, sandy, similar to 320-325 ft except addition of 15 percent granules Clay, gypsiferous, light-brown (5YR 5/6, damp), calcareous, 85 percent; 15 percent gypsum crystals as large as 15-20 mm Sand, clayey, medium to coarse sand, 50 percent; 25 percent granules; 25 percent light-brown CLAY, sandy (5YR 5/6, damp) clay matrix CLAY, with granules Clay, sandy, moderate—yellowish-brown (10YR 5/4, damp), calcareous; 5 percent granules percent very coarse sand; 5 percent granules; 5-25 percent gypsum crystal as large as CLAY, sandy Clay, with granules, moderate-yellowish-brown (10<u>YR</u> 5/4, damp), calcareous; 20-25 percent SAND Clay, gypsiferous, mottled light-brown (5YR 5/6, damp) and light-olive-gray (5Y 5/2, damp), calcareous, 75 percent; 20 percent gypsum granules; 5-10 percent sand CLAY, with granules Clay, sandy, light-brown (5YR 5/6, damp), calcareous; abundant very fine mica; 5-10 percent GRAVEL, granule Clay, gypsiferous, moderate—yellowish-brown (10YR 5/4, damp), calcareous, 55 percent; 25 percent gypsum; 15 percent granules; 5 percent very sand; less than 3 percent granules CLAY, with granules Clay, with granules, moderate-brown (5XF 4/4, damp), calcareous; 20-30 percent granules; 400 - 405 Clay, gypsiferous, similar to 395-400 ft except CLAY, with granules 45 percent clay; 35 percent gypsum crystals Clay, with granules, dark-yellowish-brown (10YN 4/2, damp), calcareous; 10-20 percent sand; GRAVEL, sandy Clay, gypsiferous, moderate—yellowish—brown (10<u>VR</u> 5/4, damp), calcareous, 70 percent; 15 percent gypsum crystals; 15 percent very coarse sand Gravel, granule; 55 percent granules; 30 percent Total depth (TD) = 425 ft sand; 10-15 percent dark-yellowish-brown (10YR 4/2, damp) calcareous clay Clay, gypsiferous, light-brown (5YR 6/4, damp), calcareous, 75 percent; 25 percent gypsum crystals as large as 20 mm Clay, with granules, moderate-yellowish-brown granules, 15 percent fine sand Clay, with granules, light-brown (5YR 6/4, damp), calcareous, 60 percent; 20 percent granules; 15 percent coarse sand; 5 percent very Clay, with granules, similar to 370-375 ft except granules increasing to 25 percent; medium to coarse sand increasing to 20 percent Clay, with granules, mottled light-brown (5YR 5/6, damp) and light-olive-gray (5Y 5/2, damp), calcareous, 65-75 percent; 15 percent granules; 10 percent pebbles with 20 mm CLAY, gypsiferous Clay, sandy, moderate—yellowish—brown (10YP 5/4, damp), calcareous; 10-15 percent fine to medium sand; 5-10 percent granules Clay, with granules, moderate-brown (5YR 4/4, damp), calcareous; 5 percent granules; 1-3 maximum dimension; gypsum crystals as large as 60 mm percent medium sand Clay, gypsiferous, light-brown (5YR 5/6, damp), calcareous, 45 percent; 40 percent gypsum Clay, sandy, moderate—brown (5YR 4/4, damp), calcareous; 10 percent medium to coarse sand GRAVEL, granule crystals as large as 60 mm; 10 percent granules; 5 percent very coarse sand Sand, very light gray (11-8), very coarse; 10 percent moderate—brown (5YR 4/4, damp) Clay, gypsiferous, light-brown (5YR 5/6, damp), calcareous, 50 percent; 30-40 percent gypsum calcareous clay matrix GYPSUM, clayey Clay, with granules, moderate-brown (5<u>YR</u> 4/4, damp), calcareous; 20 percent quartzose CLAY, sandy Gravel, granule; 50 percent granules; 10 percent very coarse sand; 40 percent light-brown (5YR 5/6, damp) calcareous clay matrix; CLAY, gravelly Gravel, granule, light-gray (N-8), quartose; 5 percent dark-yellowish-brown (10YR 4/2, gypsum crystals in clay damp) calcareous clay Clay, with granules, moderate-brown (5½R 4/4, damp), calcareous; 20 percent granules, 10 percent medium sand; occasional gypsum Total depth (TD) = 505 ft Clay, sandy, light-brown (5<u>YR</u> 5/6, damp), calcareous, 50 percent; 25 percent very coarse sand; 15 percent granules, 10 percent pebbles

COLUMNAR SECTION FROM

PALEN DRY LAKE NO. 2

LITHOLOGIC LOG FROM PALEN DRY LAKE TEST WELL NO. 1 LITHOLOGIC LOG FROM PALEN DRY LAKE TEST WELL NO. 2

The Federal Land Policy and Management Act of 1976 (Public Law 94-579) directed the Secretary of the Interior to prepare and implement by September 1980 a comprehensive long-range plan for the management, use, development, and protection of public lands within the California Desert Conservation Area (CDCA). The responsibility to prepare this plan was assigned to the Eureau of Land Management's (ELM) California Desert Planning Staff. The ELM was directed to evaluate mineral as well as botanical, wildlife, cultural, and recreation resource data for effective multiple-use land planning. In turn, the ELM requested assistance from the U.S. Geological Survey (USGS) in defining the mineral resources.

In 1978 the USGS drilled 56 shallow test wells to depths of 50-600 ft to provide ELM with the requested mineral resource data. The lithologic, geophysical, and water quality data obtained from test wells drilled on Palen Dry Lake, Calif., are presented in this report.

LOCATION AND DRILLING METHODS

Two test wells were drilled on Palen Dry Lake. Test well FDL No. 1 was drilled in Nellw! sec. 27, T. 5 S., R. 17 E., SEM, California (lat. 33°42'48" N., long. 115°11'41" W.), to a depth of 505 ft. Test well FDL No. 1 was drilled in SwISE! sec. 16, T. 5 S., R. 17 E., SEM (lat. 33°43'48" N., long. 115°12'43" W.) to a depth of 425 ft. FDL No. 1 was completed on March 4, 1978; FDL No. 2 was completed on March 6, 1978. Both test wells were drilled using a conventional rotary drill using a mixture of air and imported fresh water to cool the bit and return cuttings to the surface.

A continuous lithologic log was completed during drilling. Sediment samples were collected at 5-ft intervals and were described in the field. Field lithologic descriptions were supplemented by microscopic study when the samples were returned to the laboratory. Sediment names used in this report are those defined by Folk (1968). The rock-color chart (Goddard and others, 1948) was used to color classify damp to wet samples. Litho-

INTRODUCTION

GEOPHYSICAL LOG

A gamma-ray log was completed from the land surface to a drilled depth of 412 ft. The log was run through the drill string because the playa sediments would have squeezed in or collapsed and sealed the test well before conventional open-hole logs could be completed. Since the geophysical log was run through the drill string, a correction of the natural radioactivity, measured in counts per second must be made before an interpretation of the gamma-ray log is possible. The necessary data for the correction described on Schlumberger Chart GR-2 are listed below. Even after correction only a qualitative interpretation of natural radioactivity is possible because the sonde was not calibrated.

Test well diameter: 5.125 in.

Total thickness of dual-wall drill pipe: 0.28 in.

drill pipe: 0.28 in.

Drill string inner diameter: 1.815 in. Sonde outer diameter: 1.125 in.

Drill string outer diameter: 2.875 in. Logging speed: 17 ft/min

ACKNOWLEDGEMENTS

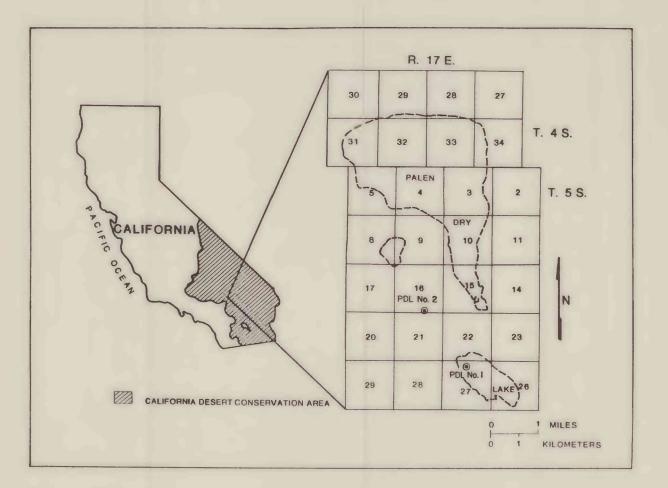
J. D. Cathcart, U.S. Geological Survey, Denver, Colo., ran geophysical logs of the subsurface. G. T. Server supplemented field lithologic descriptions by laboratory study of sediment cuttings under binocular microscope.

REFERENCES

Folk, R. L., 1968, Petrology of sedimentary rocks: Austin, University of Texas, 170 p.

Coddard, E. N., chm., and others, 1948, Rock-color chart: National Research Council; reprinted by Geological Society of America, 1951, 1963, 1970, 6 p.

Schlumberger Well Services, (1975), Cased hole applications, 1975 Edition: Houston, Texas, 124 p.



Multiply English unit By To obtain metric units

Inches (in.) 2.540 Centimeters (cm)

Feet (ft) 0.305 Meters (m)

This report has not been edited for conformity with U.S. Geological Survey editorial standards.

calcareous, 50 percent; 20 percent pebbles as large as 30 mm; 10 percent very coarse

Gravel, sandy, light-gray (N-8); 10 percent medium sand; 5 percent moderate-brown (4Y 4/4, damp) calcareous clay